Calculus Warm Up #2-4

t (seconds)	0	8	20	25	32	40
$v(t)$ (meters per second)	3	5	−10	−8	−4	7

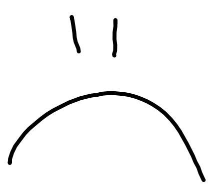
The velocity of a particle moving along the x-axis is modeled by a differentiable function v, where the position x is measured in meters, and time t is measured in seconds. Selected values of $v(t)$ are given in the table above. The particle is at position $x = 7$ meters when $t = 0$ seconds.

(a) Estimate the acceleration of the particle at $t = 36$ seconds. Show the computations that lead to your answer. Indicate units of measure.

(b) Using correct units, explain the meaning of $\int_{20}^{40} v(t)\,dt$ in the context of this problem. Use a trapezoidal sum with the three subintervals indicated by the data in the table to approximate $\int_{20}^{40} v(t)\,dt$.

HW Questions: p. 585

#9)



Let's skip this one!

HW Questions: p. 585

In Exercises 1–10, determine the convergence or divergence of the given series using the Integral Test.

1. $\sum_{n=1}^{\infty} \frac{1}{n+1}$

3. $\sum_{n=1}^{\infty} ne^{-n}$

$u\downarrow$	$dv\uparrow$

$$\lim_{b\to\infty} \int_1^b x e^{-x}\, dx$$

$$\lim_{b\to\infty} \left[-xe^{-x} - e^{-x}\right]_1^b$$

$$\lim_{b\to\infty} \left[-\frac{1}{e^x}(x+1)\right]_1^b$$

$$\lim_{b\to\infty} \left[-\frac{1}{e^b}(b+1) + \frac{1}{e}(1+1)\right]$$

L' Hôp $\quad + \frac{2}{e}$

$$0 + \frac{2}{e}$$

5. $\frac{1}{2} + \frac{1}{5} + \frac{1}{10} + \frac{1}{17} + \frac{1}{26} + \cdots$

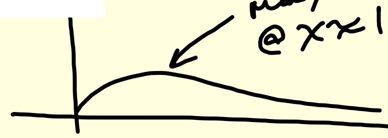
$$\sum_{n=1}^{\infty} \frac{1}{n^2+1}$$

7. $\frac{\ln 2}{2} + \frac{\ln 3}{3} + \frac{\ln 4}{4} + \frac{\ln 5}{5} + \frac{\ln 6}{6} + \cdots$

5. $\frac{1}{2} + \frac{1}{5} + \frac{1}{10} + \frac{1}{17} + \frac{1}{26} + \cdots$

7. $\frac{\ln 2}{2} + \frac{\ln 3}{3} + \frac{\ln 4}{4} + \frac{\ln 5}{5} + \frac{\ln 6}{6} + \cdots$

max @ $x \approx 1.7$



$x \geq 2$

$$\lim_{b\to\infty} \int_2^b \frac{\ln(x+1)}{x+1}\,dx$$

$u = \ln(x+1)$

$du = \frac{1}{x+1}\,dx$

$$\lim_{b\to\infty} \frac{1}{2}\left[\ln(x+1)\right]^2 \Big]_2^b$$

$$\infty$$

In Exercises 11–20, determine the convergence or divergence of the given p-series.

11. $\sum_{n=1}^{\infty} \frac{1}{n^3}$

13. $\sum_{n=1}^{\infty} \frac{1}{\sqrt[5]{n}}$

15. $1 + \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} + \frac{1}{\sqrt{4}} + \cdots$

17. $1 + \frac{1}{2\sqrt{2}} + \frac{1}{3\sqrt{3}} + \frac{1}{4\sqrt{4}} + \frac{1}{5\sqrt{5}} + \cdots$

19. $\sum_{n=1}^{\infty} \frac{1}{n^{1.04}}$

Tan Classwork: Do all of 2004 #6,

Do just a & b on 2010B # 5

(we already did part c as a warm up)

Get organized: Week 2 Classwork

Staple: Warm up on top

Yellow FR Practice

Tan FR Practice

Tan classwork: front side

Slope Fields & Differential Equations Review. (No Calculator)

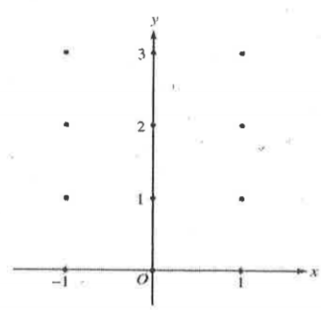
2004 #6

Consider the differential equation $\frac{dy}{dx} = x^2(y-1)$.

(a) On the axes provided, sketch a slope field for the given differential equation at the twelve points indicated.

(b) While the slope field in part (a) is drawn at only twelve points, it is defined at every point in the xy-plane. Describe all points in the xy-plane for which the slopes are positive.

(c) Find the particular solution $y = f(x)$ to the given differential equation with the initial condition $f(0) = 3$.



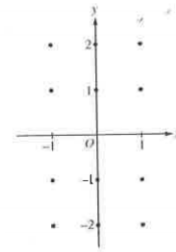
Tan classwork: backside

2010B #5
(No Calculator)

Consider the differential equation $\frac{dy}{dx} = \frac{x+1}{y}$.

(a) On the axes provided, sketch a slope field for the given differential equation at the twelve points indicated, and for $-1 < x < 1$, sketch the solution curve that passes through the point $(0, -1)$.

(b) While the slope field in part (a) is drawn at only twelve points, it is defined at every point in the xy-plane for which $y \neq 0$. Describe all points in the xy-plane, $y \neq 0$, for which $\frac{dy}{dx} = -1$.



HW: p. 585, # 21 - 31 odd

and finish classwork!

(answers to Tan follow)

2004 #6

b) slopes are positive for all points where $y > 1$ and $x \neq 0$

c) $f(x) = 2e^{x^3/3} + 1$

2010B #5

b) slope $= -1$ for $y = -x - 1$;

$y \neq 0 \longrightarrow x \neq -1$